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Registered Utility Model

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(71) Name and domicile of owner:
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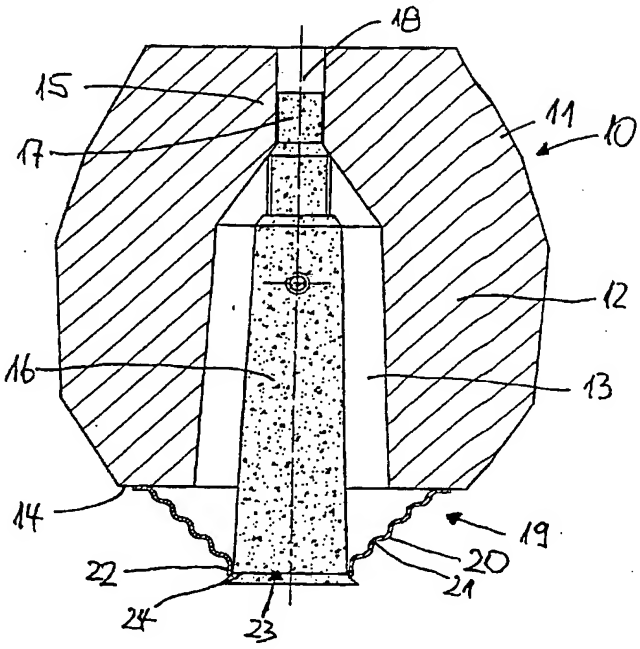
41515 Grevenbroich, DE

The following information has been derived from the documents provided by the applicant

(54) Designation: **Feeder with deformable metallic base**

(57) Main claim: A feeder sleeve to be used in a casting mould, employed when casting metals, consisting of a feeder body, having an inner feeder space, and made from an exothermic and/or insulating material, to whose lower face facing the mould area forming the casting a metallic base is attached, in which the metallic base is shaped such that it projects from the lower face of the feeder to the upper face of the mould, and also has a feeder aperture designed to form an intended shearing point for the feeder residue formed in the feeder space, and the feeder sleeve, with the metallic base, can be placed, when producing the casting mould, on a supporting mandrel attached to the pattern forming the mould for the casting, characterised in that the metallic base (19) is in the general form of a cone tapering from the lower face (14) of the feeder sleeve (10) to the upper face of the mould such that, with a completely finished mould, a lower end section (22) of the metallic base (19) forming the feeder aperture (23) terminates at the upper face of the mould, and that the conical casing (20) of the metallic base (19) encircling the supporting mandrel has at least one intended bending point...



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STEPPED DIAPHRAGM
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Attached drawings

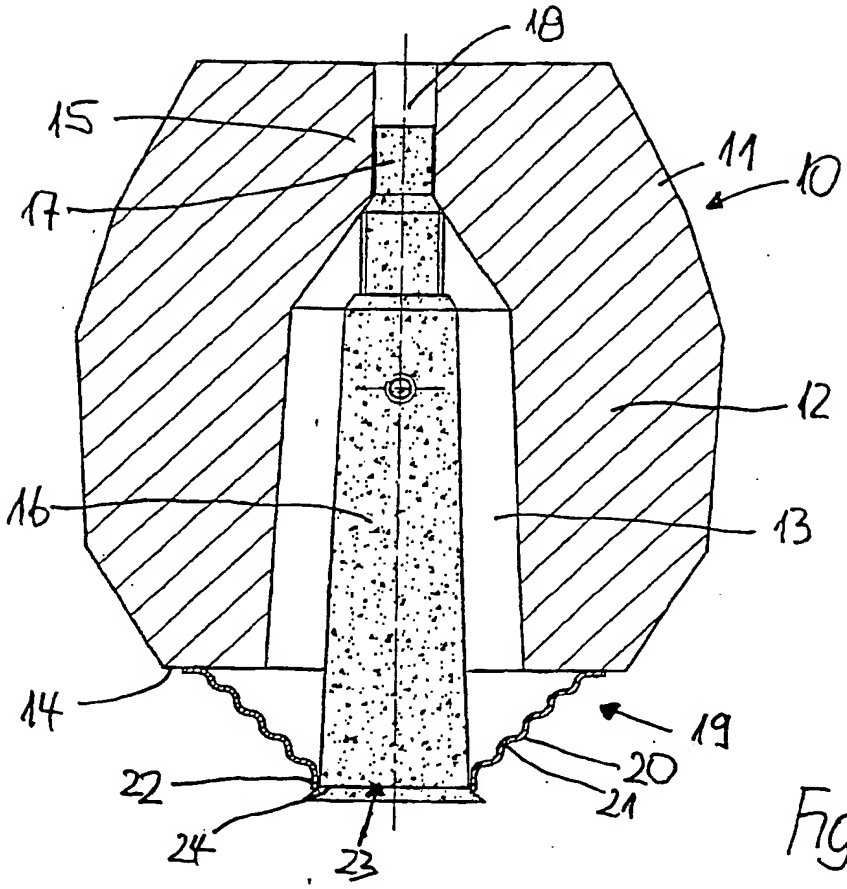

Fig. 1

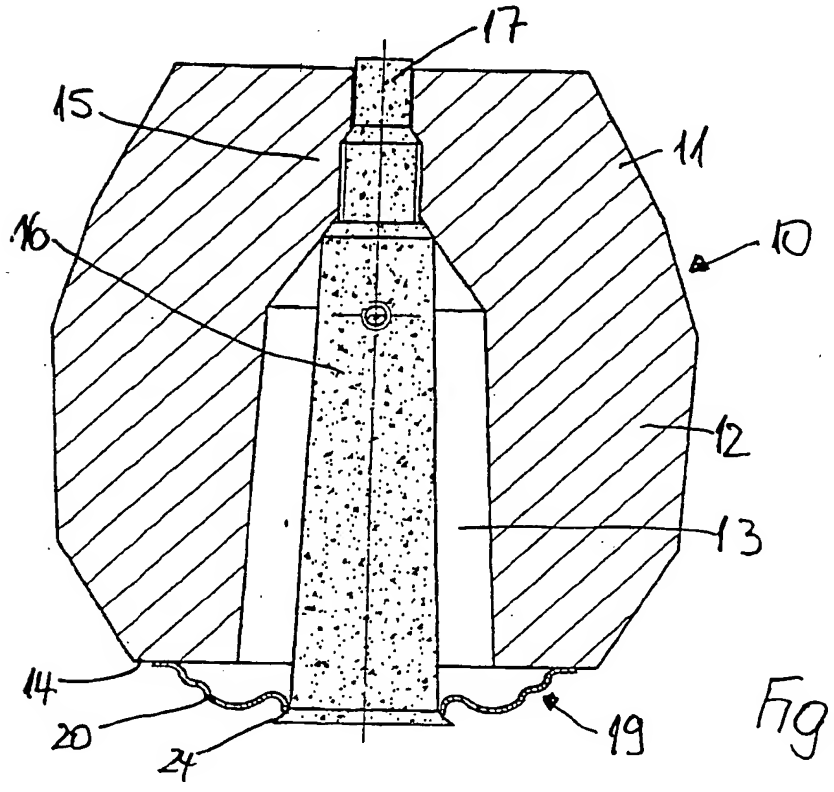

Fig. 2

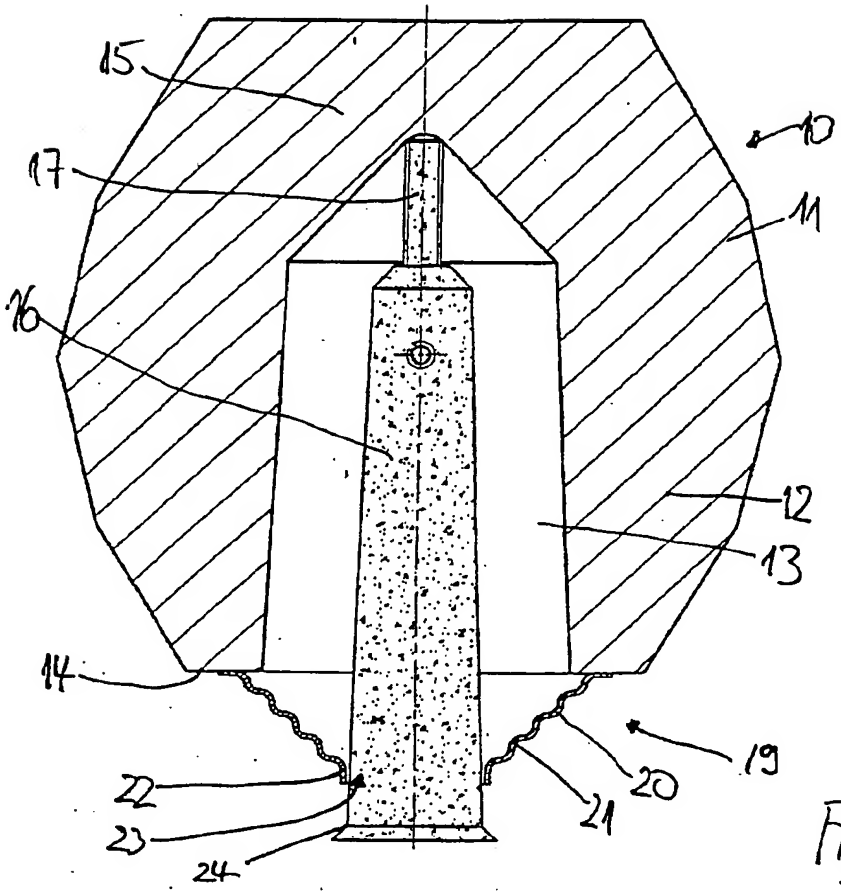

Fig. 3

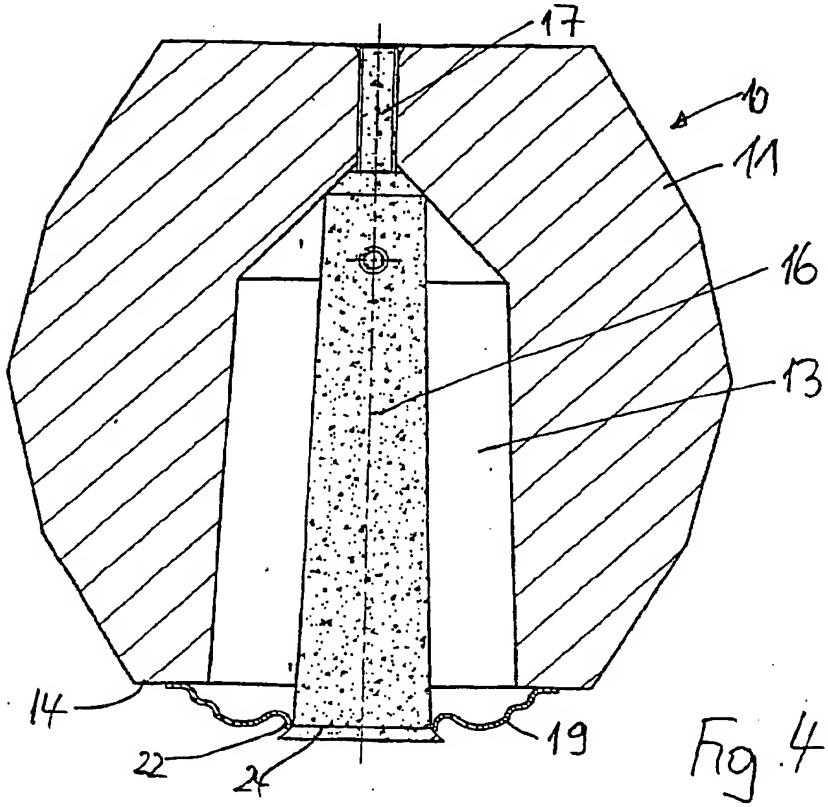

Fig. 4

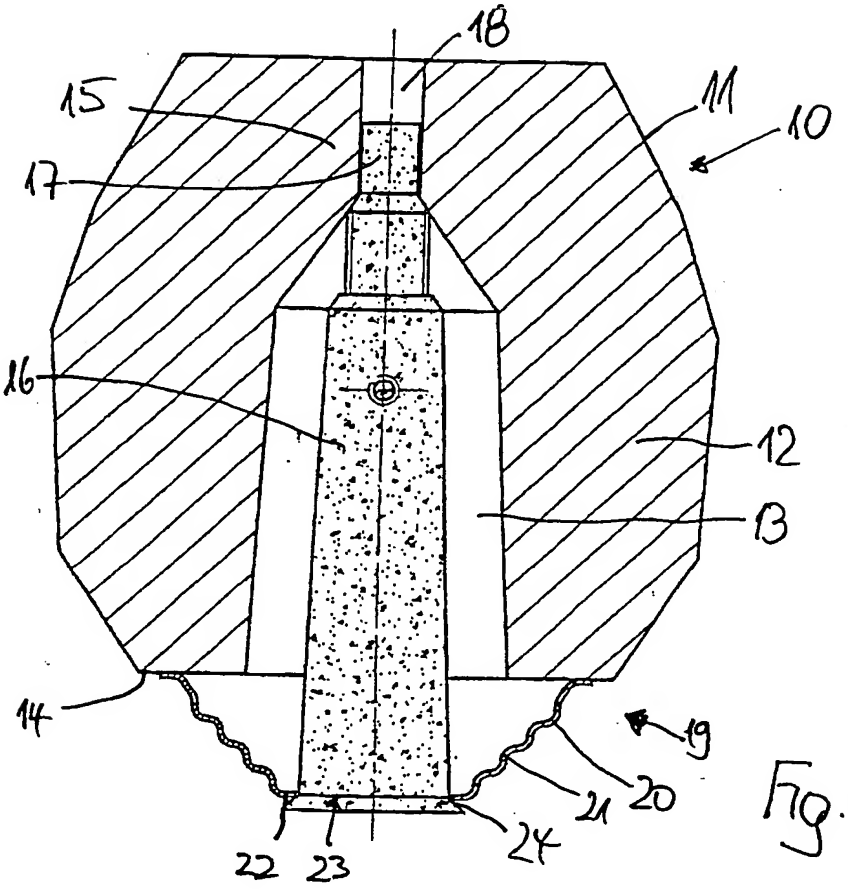

Fig. 5

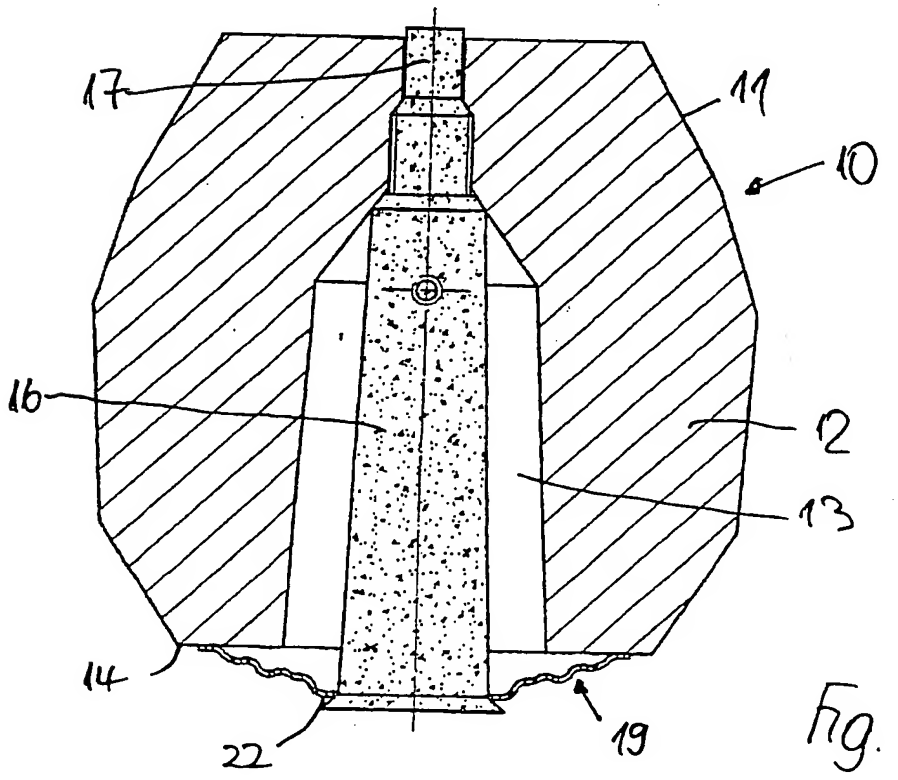

Fig. 6

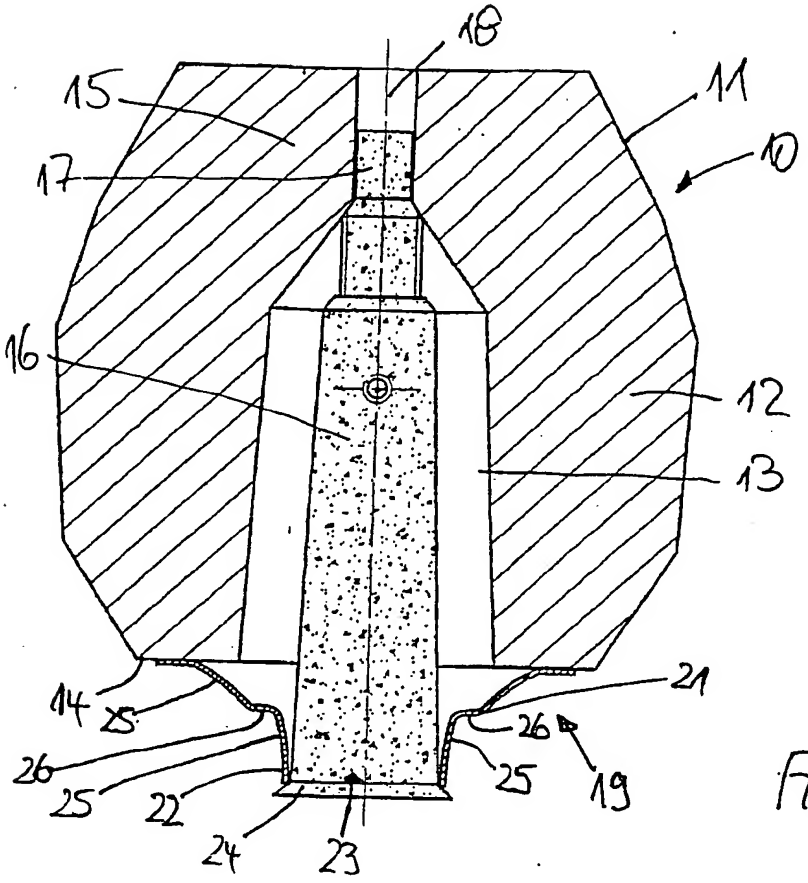
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Fig. 7

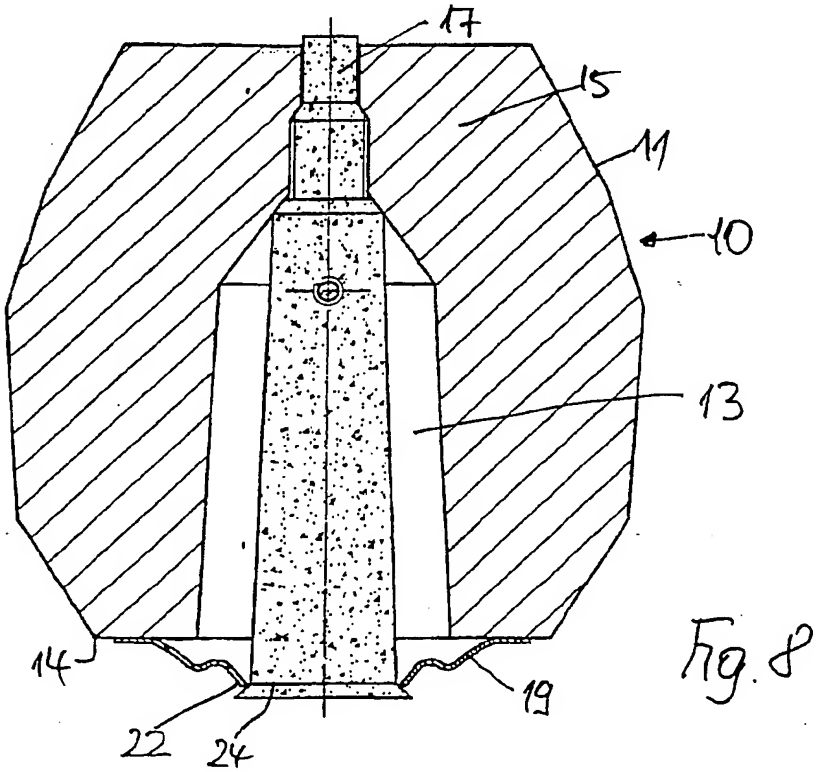
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Fig. 8

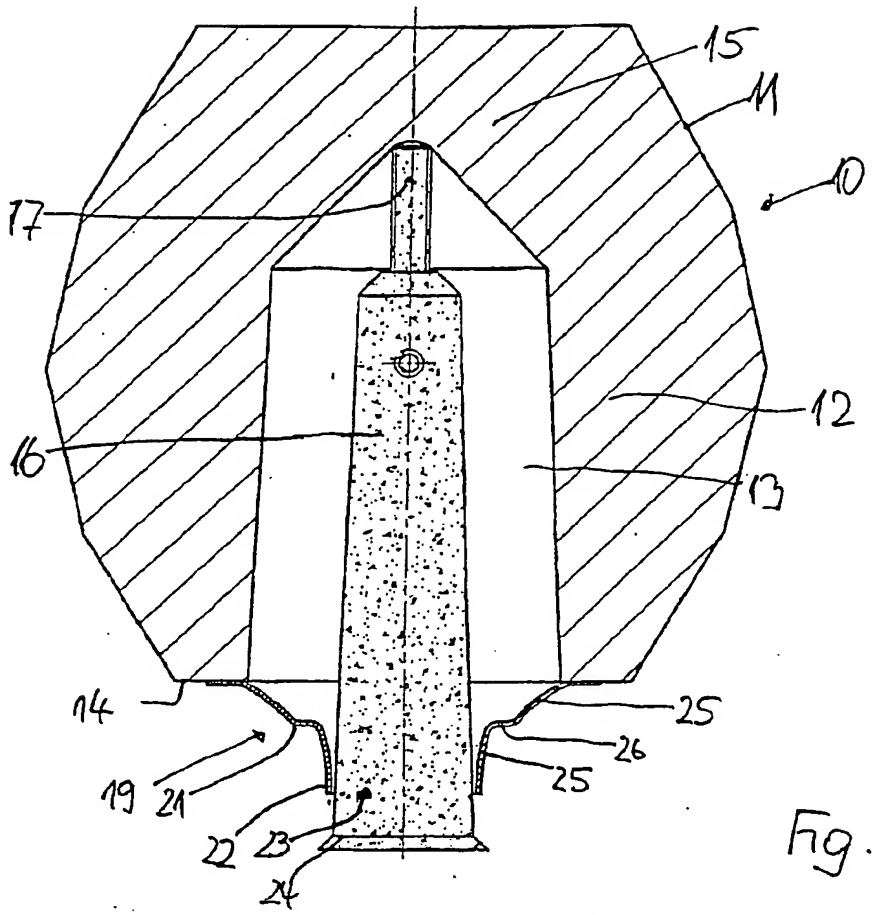
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Fig. 9

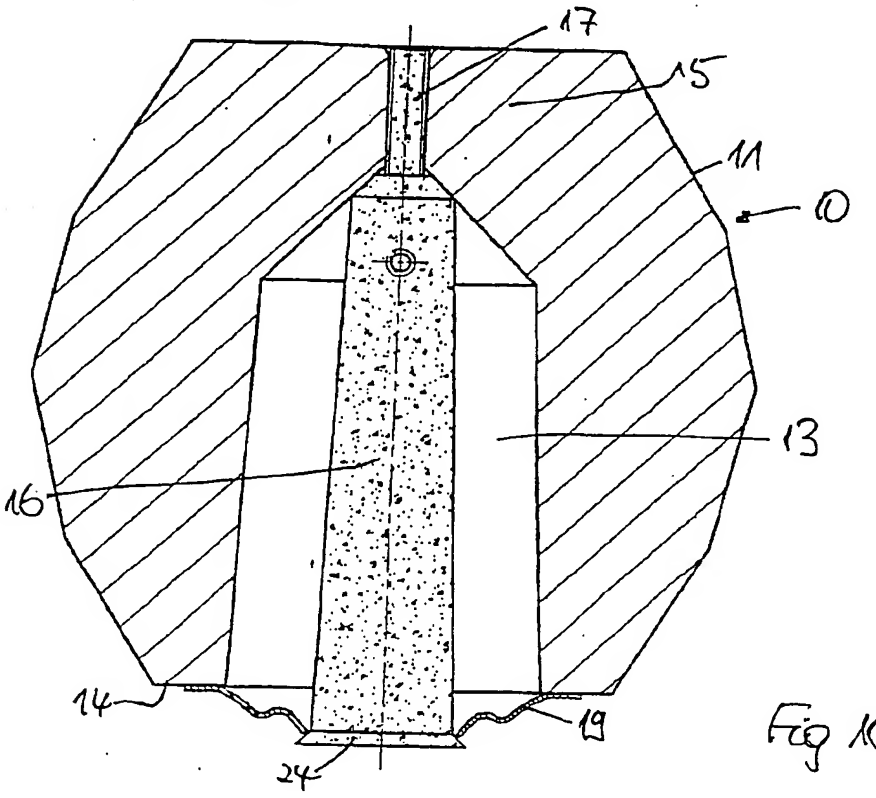
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Fig 10

Description

[0001] The invention concerns a feeder sleeve used in a casting mould, employed when casting metals, consisting of a feeder body, having an inner feeder space, and made from an exothermic and/or insulating material, to whose lower face facing the mould area forming the casting a metallic base is attached, in which the metallic base is shaped such that it projects from the lower face of the feeder to the upper face of the mould, and also has a feeder aperture designed to form an intended breaking point for the feeder residue formed in the feeder space, and the feeder sleeve, with the metallic base, can be placed, when producing the casting mould, on a supporting mandrel attached to the pattern forming the mould for the casting.

[0002] A feeder sleeve with the features described above is known from DE 201 12 425 U1. The state of the art can be assumed, from this, that, when using the known feeder sleeve, by shaping the pattern and also forming the feeder with the mould sand or a suitable mould material mixture, a layer of sand is intended to form between the metallic base of the feeder sleeve and the upper face of the pattern, present when the casting mould is being made or, as the case may be, the eventual upper face of the mould, in order to form a separating layer between the feeder sleeve and the hot upper metal surface of the casting that forms when pouring the casting in the mould cavity. At the same time, however, the feeder aperture of the metallic base must be in the closest possible contact with the upper face of the mould to ensure that the residual feeder material remaining, after pouring, on the casting due to the feeder sleeve, will break off at the correct point, thereby avoiding costly fettling on the finished casting. Finally the metallic base performs the function, during forming, of bearing the pressure exerted on the feeder sleeve so that, with the hat-like shape of the metallic base formed according to the state of the art, there is a requirement for the metallic base to be stiffened.

[0003] It has now turned out that, due to the inconsistent sand layer between the lower face of the metallic base facing the pattern or upper face of the mould, and the upper face of the pattern, the process of breaking off the feeder residue is not always consistent, and, therefore, the invention is based on the task of further improving a feeder sleeve with generic features aimed at providing a precisely-positioned shearing edge for parting the feeder residue and improving the process reliability of the feeder sleeve when moulding it into the casting mould.

[0004] The solution to this task is provided, together with advantageous derivatives and further developments of the invention, in the patent claims further below in this description.

[0005] In its basic concept, the invention provides for the metallic base being in the general form of a cone tapering from the lower face of the feeder sleeve to the upper face of the mould, such that, with a completely finished mould, a lower end section of the metallic base forming the feeder aperture terminates at the upper face of the mould, and that the conical casing of the metallic base encircling the supporting mandrel has at least one intended bending point. An advantage derived from the invention is that, due to the generally conical shape of the metallic base and its established contact with the upper face of the mould after completion of the forming process, the formation of a sand layer before or during the forming process is prevented so that, due to the location of the feeder aperture directly over the mould cavity, a defined shearing point for breaking off the feeder residue is provided at the upper surface of the casting. Insofar as the lower section of the metallic base, according to its shape, remains in contact with the upper face of the pattern or comes into contact with it during the forming process, at least one bending point is provided in the conical casing of the metallic base encircling the supporting mandrel to protect the feeder sleeve from the forming pressure during the forming process, and particularly against any impact from the forming, so that the metallic base of the feeder sleeve can yield during the forming process.

[0006] Insofar as, according to the state of the art, the supporting mandrel attached to the pattern is designed as a rigid mandrel or as a pliable spring mandrel, both structural forms are provided for in the supporting mandrel for the feeder sleeve used for the invention.

[0007] According to one design example of the invention, a number of bending points are provided in the generally conical casing across its span.

[0008] With regard to the shape of the overall conical casing, according to a first design example of the invention, the diameter reduces constantly over its entire surface. Alternatively, the design can be such that the generally conical shape of the casing of the metallic base can be formed from a number of casing sections adjacent and at an angle to each other, in which the joint lines between the casing sections form the intended bending points. A further alternative can provide a design in which the generally conical shape of the casing of the metallic base can be formed from a number of casing sections adjacent to each other, in which casing sections, arranged alternately and parallel to the lower face of the feeder sleeve, are located between the casing sections that stand at an angle to

the longitudinal axis of the feeder sleeve, and the joint lines between the individual casing sections form the intended bending points.

[0009] With regard to the connection of the end section forming the feeder aperture to the upper face of the pattern or the upper face or the upper face of the mould, the design can be such that the end section of the casing of the metallic base encircling the feeder aperture is arranged parallel to the upper face of the mould and, when the feeder sleeve is placed on the supporting mandrel, the end of the casing encircles the supporting mandrel on its lower edge standing on the pattern.

[0010] Alternatively, it can be arranged that the end section of the casing of the metallic base encircling the feeder aperture is at an angle of less than 90° to the longitudinal axis of the feeder sleeve.

[0011] In a further alternative, it can be arranged that the end section of the metallic base encircling the feeder a perture is parallel to the external circumference of the supporting mandrel, in which it is specifically provided that, when the feeder sleeve is place on the supporting mandrel, the end section of the casing of the metallic base rests on the circumferential surface of the supporting mandrel.

[0012] With regard to installing the feeder sleeve on the pattern to produce the casting mould before introducing the moulding sand, it can be arranged that the lower end section of the metallic base of the feeder sleeve, with the feeder sleeve placed on the supporting mandrel, rests on the upper face of the pattern; in this case, the metallic base of the feeder sleeve, designed with intended bending points, will bear the load directly arising during the forming operation.

[0013] Alternatively, it can be arranged that there is a gap between the lower end section of the metallic base of the feeder sleeve and the upper face of the pattern; in this case, as the mould is being made, the feeder sleeve can move in the direction of the upper face of the mould, in which the conically-formed end section of the metallic base, as the feeder sleeve moves, forces away the moulding sand lying in the immediately adjacent space between the metallic base and the upper face of the mould, whereupon the intended bending points on the metallic base can take up the residual load arising once the movement of the feeder sleeve has ceased.

[0014] The drawing reproduces examples of versions of the invention, described as follows:

[0015] **Fig.** 1: A feeder sleeve located on a supporting mandrel before creating the shape with moulding sand,

[0016] **Fig.** 2: The feeder sleeve as in **Fig.** 1 after the forming process,

[0017] **Fig.** 3: the items in **Fig.** 1 in a modified design version before the forming process,

[0018] **Fig.** 4: the items in **Fig.** 3 after the forming process.

[0019] **Fig's.** 5 and 6: the items in **Fig's. 1** and 2 in a modified design version before and after the forming process,

[0020] **Fig's.** 7 to 10: another version of the feeder sleeve designed and used as shown in **Fig's.** 1–4.

[0021] The feeder sleeve **10** first shown in **Fig.** 1 has a feeder body **11**, comprising a feeder space **13**, a surrounding wall area **12**, a cover area **15** and a lower face **14**. In the illustration in **Fig.** 1, the feeder sleeve **10** is located on a supporting mandrel **16**, where the supporting mandrel is mounting on a pattern, that is not illustrated, to form the mould cavity for the casting that it is planned to cast. In the cover region **15** of the feeder sleeve **10**, an aperture **18** is formed into which the tip **17** of the supporting mandrel **16** extends such that, if there is relative movement of the feeder sleeve **10** relative to the supporting mandrel **16** during the moulding operation, the tip **17** of the supporting mandrel **16** moves into the aperture **18** of the feeder sleeve **10**.

[0022] A metallic base **19**, designed preferably as a thin-walled component is attached, for example with adhesive, to the underside of the feeder sleeve **10** and with the lower face **14**. This metallic base **19** has a generally conical shape tapering from the lower face **14** of the feeder sleeve **10** to the lower edge **24** of the supporting mandrel **16**, whereby a number of intended bending points **21** are formed over the face of the conical casing **20**. The lower end section **22** of the metallic base **19** encircling the feeder aperture **23** blocked by the supporting mandrel **16** extending into the feeder sleeve **10** runs parallel, in the design example shown, to the external perimeter of the supporting mandrel **16**, in such a way that the lower end section **22** lies on the circumferential face of the supporting mandrel **16**.

[0023] It can be readily seen from the illustration in **Fig.** 1 that, when introducing moulding sand or another suitable mixture of moulding material around the feeder sleeve, the sand can flow only as far as the conical casing **20** of the metallic base **19**, during the course of which the lower section **22** of the metallic base **19**, with the feeder aperture **23** that it provides, forms a blockage between the feeder space **13** or, as the case may be, the internal space of the metallic base **19** filled by the metal as it rises through the feeder aperture **23** during the pouring process, and the casting, and this constriction provides the exact location for breaking off the feeder residue through the use of the feeder sleeve with its metallic base **19**.

[0024] The behaviour of the feeder sleeve **10**, illustrated in **Fig.** 1, during the forming process can be seen by

comparing **Fig's.** 1 and 2, where, clearly in **Fig.** 2, the feeder sleeve has sunk lower, due to the applied forming pressure, towards the lower edge region **24** of the supporting mandrel **16**, and where this lowering has been compensated by the bending of the conical casing **20** of the metallic base **19** at the intended bending points **21**.

[0025] The variants illustrated in **Fig's.** 3 and 4 differ essentially from the design shape already described in **Fig's.** 1 and 2 in that the lower section of the metallic base **19** does not rest on the lower edge region **24** of the supporting mandrel **16** when the feeder sleeve is placed over it, but at some distance from the lower edge region **24** of the supporting mandrel **16**, so that – as a comparison of **Fig.** 3 and 4 reveals – as the forming is taking place, the feeder sleeve **10** first moves along the supporting mandrel **16**, during which, due to the conical shape of the casing **20** and the lower section **22** of the metallic base **19** fitting closely and parallel to the external circumference of the supporting mandrel **16**, the moulding sand that at first entered this area is forced away until the constriction so formed as the lower end section **22** of the metallic base **19** contacts the lower edge region **24** of the supporting mandrel **16**, providing the intended breaking point. In this arrangement, there is no penetration into the cover region **15** of the feeder sleeve **10** so that, through the movement of the feeder sleeve **10** over the supporting mandrel **16**, the tip **17** of the supporting mandrel **16** pierces the cover region **15**, breaking through it; this modification does not affect, however, the action and shaping of the metallic base **19**.

[0026] The design example shown in **Fig's.** 5 and 6 corresponds essentially to the design example described in **Fig's.** 1 and 2 except that the lower section **22** of the metallic base **19** is now arranged parallel to the lower face **14** of the feeder sleeve **10** and, in this arrangement, encircles the lower edge region **24** of the supporting mandrel **16**. Since this design version does not provide for a movement of the feeder sleeve **10** along the supporting mandrel **16** before the metallic base **19** bends, on the contrary, the lower end section **22** encircles the lower edge region **24** of the supporting mandrel **16** before the forming process, providing the same effect as described in **Fig's.** 1 and 2.

[0027] In **Fig's.** 7–10, compared to the two different design examples described in **Fig's.** 1 to 4, the shape of the metallic base **19** is changed in that the generally conical shape of the metallic base **19** is produced with two casing sections **25** arranged at an angle of less than 90° to the longitudinal axis of the supporting mandrel **16**, the casing section **25** being attached by a casing section **26** extending parallel to the lower face **14** of the feeder sleeve **10**. The transitions between the casing section **26** and the other casing sections **25** adjacent to them form the intended bending points **21**. At the same time, the lower end section **22** of the lower casing section face **25** is arranged essentially parallel to the longitudinal axis of the supporting mandrel **16** and rests on its external circumferential face. Compared with the different design examples according to **Fig's.** 7 and 8 on the one hand, or **9** and **10** on the other, the lower end section **22** can rest on the lower edge region **24** of the supporting mandrel **16** or can be arranged such that there is a gap. The features of the subject matter in these documents disclosed in the above description, in the claims and in the drawing can be material either individually or also in combinations to fulfil the requirements of the invention in their different design forms.

Patent claims

1. A feeder sleeve to be used in a casting mould, employed when casting metals, consisting of a feeder body, having an inner feeder space, and made from an exothermic and/or insulating material, to whose lower face facing the mould area forming the casting a metallic base is attached, in which the metallic base is shaped such that it projects from the lower face of the feeder to the upper face of the mould, and also has a feeder aperture designed to form an intended shearing point for the feeder residue formed in the feeder space, and the feeder sleeve, with the metallic base, can be placed, when producing the casting mould, on a supporting mandrel attached to the pattern forming the mould for the casting, **characterised in that** the metallic base **(19)** is in the general form of a cone tapering from the lower face **(14)** of the feeder sleeve **(10)** to the upper face of the mould such that, with a completely finished mould, a lower end section **(22)** of the metallic base **(19)** forming the feeder aperture **(23)** terminates at the upper face of the mould, and that the conical casing **(20)** of the metallic base **(19)** encircling the supporting mandrel **(21)** has at least one intended bending point.

2. A feeder sleeve according to Claim 1, characterized in that a number of intended bending places **(21)** are formed in the conical casing face **(20)** of the metallic base **(19)** over its surface.

3. A feeder sleeve according to Claims 1 or 2, characterized in that the diameter of the conical casing face **(20)** of the metallic base **(19)** decreases constantly over its surface.

4. A feeder sleeve according to Claims 1 or 2, characterized in that the generally conical shape of the casing (20) of the metallic base (19) is formed from a number of casing sections (25, 26) adjacent and at an angle to each other, in which the joint lines between the casing sections form the intended bending points (21).

5. A feeder sleeve according to Claims 1 or 2, characterized in that the generally conical shape of the casing (20) of the metallic base (19) is formed from a number of casing sections (25, 26) adjacent to each other, in which casing sections (26), arranged alternately and parallel to the lower face (14) of the feeder sleeve (10), are located between the casing sections (25) that stand at an angle to the longitudinal axis of the feeder sleeve (10), and the joint lines between the individual casing sections (25, 26) form the intended bending points (21).

6. A feeder sleeve according to one of Claims 1 to 5, characterized in that the end section (22) of the casing (20) of the metallic base (19) encircling the feeder aperture (23) is arranged parallel to the upper face of the mould and, when the feeder sleeve (10) is placed on the supporting mandrel (16), the end of the casing encircles the supporting mandrel (16) on its lower edge (24) standing on the pattern.

7. A feeder sleeve according to one of Claims 1 to 5, characterized in that the end section (22) of the casing (20) of the metallic base (19) encircling the feeder aperture (23) is at an angle of less than 90° to the longitudinal axis of the feeder sleeve (10).

8. A feeder sleeve according to one of the Claims, characterized in that the end section (22) of the casing (20) of the metallic base (19) encircling the feeder aperture (23) is arranged parallel to the external circumference of the supporting mandrel (16).

9. A feeder sleeve according to Claim 8, characterized in that, with the feeder sleeve (10) placed on the supporting mandrel (16), the end section of the casing (20) of the metallic base (19) rests on the circumferential face of the supporting mandrel (16).

10. A feeder sleeve according to one of the Claims 1 to 9, characterized in that, with the feeder sleeve (10) placed on the supporting mandrel (16), the lower end section (22) of metallic base (19) rests on the upper face of the pattern.

11. A feeder sleeve according to one of the Claims 1 to 9, characterized in that the lower end section (22) of metallic base (19) of the feeder sleeve (10) is arranged with a gap between the lower end section and the upper face of the pattern.

12. A feeder sleeve according to one of the Claims (19). 1 to 11, characterized in that the metallic base is a thin-walled component

5 pages of drawings follow